

**A FINAL REPORT OF THE AAWG
CONTINUED AIRWORTHINESS OF STRUCTURAL REPAIRS**

3.0 Existing Regulation Analysis

Since the AAWG was tasked to investigate the preparation of additional rules to cover repairs to the eleven models of airplanes under the ARAC Tasking, it is important to understand how current regulations affect operators maintenance actions for repairs and how those regulations have evolved over the years.

3.1 Current Regulatory Status

Rules and guidelines that address repairs today are broadly based on certification and operational requirements. These include the following:

- FAR 1.1 - Major Alteration, Major Repair (Amendment 27)
- FAR 25.571 - Damage Tolerance Analysis (Amendment 45)
- FAR 25.1529 Appendix H25.4 - Airworthiness Limitations Section (Amendment 54)
- FAR 43.13 - Performance Rules (General)
- FAR 43.16 - Airworthiness Limitations (Amendment 54)
- FAR 43 Appendix A - Major Alterations, Major Repairs, and Preventative Maintenance (Amendment 52)
- FAR 91.403 - General (Amendment 54)
- AC 25-1529-1 - Instructions for Continued Airworthiness of Structural Repairs on Transport Airplanes (August 1, 1991)
- AC 91-56 - Supplemental Structural Inspection Program for Large Transport Category Airplanes

A review of these documents indicates that airplanes certified before FAR Amendment 45 regulations require structural repairs that restore static strength capability in accordance with FAR 1.1 and FAR 43. There is also guidance material which requests an evaluation to see if special inspection programs are necessary to detect premature degradation of structural damage tolerance capabilities as a result of repair installations. Furthermore, there are regulations that provide for mandatory compliance of any special inspection programs developed as part of the requested repair installation evaluation.

The advent of the Supplemental Structural Inspection Programs (SSIP) in the 1980's required supplemental inspections of certain structure called Principal Structural Elements (PSEs). In 1991 the FAA published AC 25.1529-1 that addresses the approval procedures to follow when making structural repairs to candidate airplanes subject to SSIP requirements. However, the methods provided herein are not the only means acceptable for ensuring continued airworthiness of structural repairs. The concepts of

**A FINAL REPORT OF THE AAWG
CONTINUED AIRWORTHINESS OF STRUCTURAL REPAIRS**

the SSIP are similar in nature to the new airplane Airworthiness Limitations Instructions (ALI) under FAR 25.1529.

Today's operational rules are similar for both the pre- and post- Amendment 45 airplanes in regards to performance standards that an airline must adhere to in repairing or altering an airplane. The requirements are clearly spelled out in FAR Part 43, Section 13(b), which states:

"Each person maintaining or altering, or performing preventive maintenance, shall do that work in such a manner and use materials of such quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition (with regards to aerodynamic function, structural strength, resistance to vibration and other deterioration, and other qualities affecting airworthiness)."

FAR 43.16 addresses airworthiness limitations, which states,

"Each person performing an inspection or other maintenance specified in an Airworthiness Limitations section of a OEMs maintenance manual or Instructions for Continued Airworthiness shall perform the inspection or other maintenance in accordance with that section, or in accordance with operations specifications approved by the Administrator under Parts 121, 123, 127, or 135, or an inspection program approved under 91.409(e)."

[Docket No. 8444 (33 FR 14104, 9/18/68)]

FAA comments regarding FAR 43.16 is documented in Amendment 43-20, Proposal 8-3, pages P - 56 and P - 57, Proposal 8 - 21, page P - 62 and Proposal 8 - 107, pages P - 78 and P - 79 support and address "Instructions for Continued Airworthiness." Upon FAA approval and OEM release of the model specific SRM updates and guidance materials, these repair assessment documents can be considered as a section of the OEMs maintenance manual or the Instructions for Continued Airworthiness.

It is interpreted that these requirements direct an airline to repair airplanes in accordance with the rules under which a particular piece of structure was certified. If the structure was certified as damage tolerant or under the requirements of an SSIP, the structure would need to be repaired in a fashion that would be equivalent to the basic PSE and/or provide an inspection program to maintain airworthiness for candidate airplanes subject to SSIP requirements.

**A FINAL REPORT OF THE AAWG
CONTINUED AIRWORTHINESS OF STRUCTURAL REPAIRS**

In addition to the documents above, the FAA has created various policy documents regarding continued airworthiness and repairs. Three of these documents are listed below.

- Repairs Made to Primary Structures on Transport Airplanes, ANM-100, April 29, 1986
- Repairs Made to Primary Structures on Transport Airplanes, NTSB A-85-140, ANM-100, June 3, 1986
- Policy Regarding Impact of Modifications and Repairs on the Damage Tolerance Characteristics of Transport Category Airplanes, ANM-100, October 27, 1989

These documents do not affect the day to day operation of airplanes requiring repairs, but are included here for completeness.

Currently there are no requirements that address retroactive requirements regarding the continued airworthiness of repairs previously installed on pre-Amendment 45 and 54 airplanes.

3.2 Responsibility

The responsibility for repairs installed on airplanes resides with the OEM for those airplanes in the process of being manufactured (FAR 21.125) and with the operator for those airplanes in-service (FAR 43.13(b), 43.16, 121.363, 367, and 369(2), (5) and (6)). It is also envisioned that international harmonization is necessary for repair assessment responsibilities.

The OEM has historically provided FAA approved repairs as a service to its operators. These repairs may be in a Structural Repair Manual or may be directly requested by the operator. Repair data may also be developed by the operators, independent DERs, or the regulatory agencies themselves. Repairs adjacent to or on third party structural modifications (STCs) may require special analysis that is only available at the STC holder.

3.3 Synopsis

It would appear that sufficient rules exist for the proper execution of repairs that will maintain continued airworthiness of the fleet. However, some OEMs and the regulators feel that the adoption of the program by all operators can not be expected without additional rulemaking.